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PATHOLOGICAL FACTS CONNECTED WITH THE USE OF ANIMAL FOOD.

There are some pathological facts connected with the use of *animal food*, to which we particularly call the attention of the reader.

"The celebrated diver, Mr. Spalding, observed that whenever he used a diet of *animal food*, or drank *spirituous liquors*, he consumed, in a much shorter period, the *oxygen* of the atmospheric air in his diving-bell; and he, therefore, had learnt from experience, to confine himself to a *vegetable diet*. He also found the same effect to arise from the use of fermented liquors; and he accordingly restricted himself to the potation of simple water. The truth of these results is confirmed by the habits of the Indian pearl-divers, who always abstain from every alimentary stimulus previous to their descent into the ocean. Those physicians who have witnessed the ravages of *pulmonary* disease will readily concur in the justness of these views."

Consumption, that sweeping curtailer of population, destroys annually about *one-fourth* of those who fall victims to disease in large cities. It has been lamented that the disorder does not *admit of a cure*, when once fairly seated; it has baffled the art, the knowledge, and the exertions of medical practitioners, who have pronounced it impossible to cure, their duty consisting in mitigating its violence and rendering easy the passage *to the grave;* while quacks and nostrum-venders have amassed princely fortunes by the sale of medicines, whose tendency it was to aggravate the disease, and to hasten the dissolution of the patient. But *is* the malady incurable? If we can point out the *cause* of consumption, is it not obvious that when the *cause* is removed, the *effect* will cease?

Consumption is a disease of the lungs.—Its *immediate* cause is an inflammation or ulceration of their tissue—its *remote* cause we will endeavor to explain. Most generally, there is an hereditary predisposition to the complaint; that is, from the peculiar organization of the individual, an exciting cause is more liable to develope disease in the lungs, than in any other organ. Now, the *exciting causes* may be limited to three; firstly, to *sympathy* between the skin and lungs, and between the stomach and lungs; secondly, the *quantity* of our nourishment; and, thirdly, its *quality*.

The lungs are two bodies, formed by numerous minute cells; in shape, somewhat resembling the hoofs of an ox, and united above the heart, which is situated between them. The *trachea*, (or wind-pipe) is a tube sending off branches to the lungs, which permit the air to find its way into every one of the cells. The air-cells are formed by very thin membranes, and communicate with each other, so that the air, during inspiration may come in contact with the blood. The air, it is well known, is essential to the existence of animals; it is composed of 21 parts of oxygen and 79 of nitrogen gas, chemically united; 1 part of carbonic acid gas; and a large proportion of aqueous vapor are generally mixed with it—but if it be deprived of its *oxygen*, its inspiration will shortly prove fatal. The heart, by its muscular contraction, propels the dark blood of the veins into the lungs, to undergo purification, by coming in contact with the air, where its dark color is changed to the bright scarlet of the arteries, and its temperature rises about one degree. The air, also, which we breathe *out*, suffers great changes, being loaded with a portion of serum, or water of the blood, and having lost 2 or 3 parts of its *oxygen*, which is replaced by equal quantities of *carbonic acid* gas, the proportion of nitrogen varying but little.

The duty imposed upon the lungs, it is evident, is a very important one. Hence,

we may infer, that whatever injures *them*, powerfully affects the whole system. We now revert to our first proposition, or the *sympathy* between the skin and lungs. It has been stated that the skin, by means of perspiration, removes the worn-out particles of the body, and that the lungs perform a similar office. Now, it is highly important that this office should never be interrupted; but if, from a want of cleanliness, the pores are stopped, and a free perspiration prevented —or, if the body be *suddenly exposed, during damp, cold weather, as in coming out of a crowded assembly, by which means the perspiration is checked*, the lungs will not only have to remove its own load, but also assist the skin, and thus irritate *them*, until, at length, consumption is developed. If, however, *the quality and quantity of nourishment did not constantly affect the lungs, the occasional exposure to the vicissitudes of weather, would not be sufficient to induce disease.* The *quantity* of food eaten, if too large, increases the *quantity of blood*, which, in passing through the lungs, for purification, imposes an unnecessary duty upon them. Or, if the *quality of the food has been too stimulating, the blood, in passing through the lungs will irritate them. These irritations kept up, day after day, will inflame the lungs, especially if they are weak, producing the most serious results. Can we then wonder that consumption is so prevalent? From this view of the subject, we are led to believe, that a proper regulation of diet will not only* prevent *consumption, but likewise* cure *it.*

Those who are afflicted with consumption, must recollect, too, "That *animal food* proves more stimulant to the lungs than vegetable aliment. That *fermented* liquors are injurious to these organs, both on account of their general effects upon the circulation, and their specific action on the nervous system; increasing on the one hand the necessity of respiratory changes, and on the other diminishing the energies of the organs by which they are accomplished.

"That *moderate exercise, hilarity* of *mind*, and *abstinence* from *fermented liquors* are essentially necessary at that stage of the digestive process (see remarks upon digestion) at which the chyle is poured into the blood-vessels, in order to promote the free evolution of carbonic acid." (About *eleven ounces* of *carbon* are given off, by the lungs, during twenty-four hours. This is absolutely necessary to the perfect purification of the blood. But, it will be seen, by the experiments of Dr. Prout, that *less* carbonic acid is given off from the lungs during the influence of an alcoholic stimulant. And this remark applies to *all artificial stimuli*, including animal food, pepper, mustard, wine, ardent spirits, &c. Hence we see the importance of an individual afflicted with consumption restricting himself to a diet of vegetables and *pure* water.) "The quantity of pulmonary transpiration (water given off by the lungs,) is also influenced by various circumstances, especially the *liquid nature of the food*, and the quantity of fluids taken into the stomach."

Animal food, says Dr. Paris, "is too highly stimulant, the springs of life are urged on too fast; and disease necessarily follows."

Sir G. Mackenzie, in his history of Ireland, says, "In an island near Iceland, where no vegetables are to be got, the children invariably die of tetanus (lock-jaw) before they are three weeks old, and the population is supplied from the main land."

"Animal food, when prematurely and excessively used, (says Dr. Turnbull,) as is too frequently done with children, tends to bring on too early a maturity, to exhaust the system by an excess of strength, and, of course, to induce in the same proportion, a rapid decay. Excess of animal food makes men fat and plethoric: and, disease is the unavoidable consequence of this state of repletion.—*Graham Almanac for* 1834.

STIMULATION.

As the term stimulus is frequently used it will be well to define it, and show the distinction between a *natural* and an *artificial* stimulus. Light, for instance, is the *natural* stimulus of the eye; sound is the appropriate stimulus of the ear, and food of the nerves of taste. On the contrary, an *artificial* stimulus, in common language, is any heating substance, either liquid or solid; but let it be recollected that the warmth, and sometimes unpleasant excitement produced by the application of ardent spirits, pepper, mustard, and other stimulants, to the tongue, stomach, &c. is merely an *indication of the strong efforts made by those organs, to resist and remove the offending cause.*

There is another important fact which should never be forgotten—that *increased action is always followed by diminished power.* It is the consideration that this law regulates all sensible organized bodies, that induces us to reject and denounce the use of *artificial stimuli*, as prejudicial to the living tissue, *in whatever way applied*, whether to the stomach, or, through the medium of the senses, to the brain. To illustrate this fact by familiar example—there is an individual possessing a horse, whose strength enables him to perform a certain amount of labor in a given time, without fatigue; but the owner, by the application of the lash, (which we call a *stimulus*) urges the horse to perform double the quantity of labor, in the same space of time—this is increased action of the muscles of the horse; but, in an equal space of time,

immediately succeeding the animal is incapable, on account of his unnatural exertion, of performing as *much* labor as he is usually accustomed to—and this we call diminished power. Such is the fact with regard to the human body; if the stomach, for example, by the introduction of some artificial stimulus, has its powers of digestion considerably increased, after the stimulating effects of the substance have ceased, the digestive functions of the stomach will be less vigorous than before the introduction of the stimulus. Thus in proportion as you excite or increase the energy and activity of any organ by the application of a stimulus, above its natural and healthy standard, when that stimulus has ceased to act, the energy and activity of the organ will be as much lower than the natural and healthy standard, as they were elevated above it.

As fundamental as is the law in mechanics, that what we gain in power we lose in time—so is the physical law, that what we gain in living *fast* we lose in living *long*.—It has been supposed that the indication of health and the prospect of longevity, depends not only upon the organization, but upon the rapidity of the circulation. Now, if a man, by the constant use of exhausting stimuli, increases the rapidity and violence of the circulation of his blood, the consequence is that he shortens life and creates disease. Or a man may not inaptly be compared with a watch—the *faster it goes* the *sooner it will run down*. [Ib.

MODERATE DRINKING WORSE THAN OCCASIONAL INTOXICATION.

"This doctrine of the comparative mischiefs of occasional drinking and constant tippling, is sustained by the analogy of medicine and medication. All medicines, of the class called poisonous, are well known to have this effect. Take calomel, for example, or antimony. In a dose of thirty grains of the former, or five of the latter, a great commotion will be produced in the system for a time, but in the ordinary circumstances of a healthy adult, the effects will probably soon pass off. It is true that, taken in doses a great deal larger still, so as to overcome at once the power of life, death will ensue; but so it will if we take an overpowering dose of alcohol. Whereas, if you divide either of the above named parcels of medicine into thirty equal parts, and take one of each a day, the consequence is that the system will, long before the expiration of thirty days, be pretty well poisoned.

"The doctrine is also sustained by observation. There are many persons in every country, but especially in the countries of Europe, who taste no inebriating drink—no, not a drop—for a month or two; but when the regular period of abstinence has expired, will go and have a drunken frolic. Now, though this is injurious, yet, if all their other habits are good, they will probably live on, more free from disease, and to a greater age, than he, who with equally good habits in other respects, drinks a little every day, yet so little as to pass for a man of the most perfect temperance. The consequences to the latter are not indeed obvious, except to his physician. He knows that if an epidemic disease comes along, he is very likely not only to take it, but to have it very severely; and if taken severely at the outset, will most certainly die. Or if he escapes this, he knows, as his family physician, that he will not reach old age, ere he will be troubled with aches, and infirmities, as they are often called, which he would have utterly escaped, had he lived correctly not only in everything else, but in regard to intoxicating drinks.

"We are the more anxious to make this proof clear, and to enforce the argument we derive from it, because we believe it to be a matter of vital importance. We believe it to be almost in vain to look for relief from abstinence (though it be total,) from distilled drinks, so long as we continue to use fermented ones, even with what is commonly called moderation. Nay more, we believe that the daily use of cider, or beer, or wine, is worse for the constitution than occasional excess in distilled spirits. We believe, further, that the narcotic principle of tea and coffee, is on this ground, and on the principle just laid down, and which we believe cannot be controverted, doing an injury, of which the mass of society have no adequate conception. We regard the tea and coffee drinker, and the moderate beer and cider drinker, as not only pouring daily into the little streams which run along till they come to the great river of intemperance, and contributing by his example to a great sea of evil, of the same sort, and of all sorts, in others, but as actually poisoning himself, and sowing the seeds of disease, even in his mental frame, every day of his life. That tea and coffee, by operating on the nerves, do give pleasurable feelings at the time, and even sometimes relieve nervous diseases, especially head-aches, no one doubts; but so in most persons, will small doses of alcoholic liquors; and if it is right or safe for one person to use tea, or coffee, or cider, because it makes him feel better, or because it temporarily relieves his pain, then it is right to drink brandy for the same purposes, when it produces the same effects. This reasoning will apply to every known substance, not nutritious, whether solid or liquid; such as tobacco, opium, betel, asafœtida, &c.

"Yet such views as the foregoing will never be felt, in all their force, till the public

are taught, as commonly as they are now taught reading and writing, the sciences of anatomy and physiology, and the laws of health or hygiene. And, therefore, although the present efforts of the friends of temperance, the tee-totallers especially, will accomplish something, yet those efforts must forever be limited and circumscribed, for want of better views of the nature of man, his fondness for excitement, and the tendency of that excitement on his constitution. We despair therefore of radical reform from such a quarter. We despair of establishing the great doctrine of prevention, till people understand how to prevent.

"More than this, there is a vast variety of things which cherish the common propensity for excitement, falling short of anything poisonous in themselves, although, by feeding the propensity for excitement, they lead to the use of poisons. We allude to confectionary, to substances too highly refined or concentrated, as honey, sugar, molasses, cheese, &c.—to butter, gravies, oils, and all condiments. These, salt not excepted, unless used sparingly, blunt the appetite for plain food, and teach us to seek for something more exciting. The same effect, in a greater or less degree, is produced by animal food, in all its forms. He who drinks plain pure water, and eats plain and simple food, indulges himself in nothing which will diminish his appetite for such things—for nature's own viands—he it is alone who is the safe and the happy man; and he it is, too, who enjoys, in the highest possible degree, the true pleasures of eating and drinking.

Of the numerous modern contrivances to spoil the tastes of the young, and to lure them down to the chambers of death, we sometimes regard the confectionary shop as being unrivalled. The articles it offers are exceedingly tempting to the eye, and not less so to the taste. And what can be expected of a generation trained but to gratify their appetites, mental or physical, but that they should seize on these substances, highly concentrated as their nutritious properties are, filthy as is their composition at least in some instances, and poisonous as a few of them are found to be, by evidence the most ample as well as most conclusive?"—*Annual Report of Physiological Society.*

A SUDDEN CHANGE SUCCESSFUL.

Danvers, Nov. 27, 1837.

Mr. Cambell.—I am well satisfied with the Journal and wish to be considered a subscriber for the next volume; for it teaches us, as Christ taught, that gluttony is a sin. After reading your paper enough to satisfy myself that the principles therein taught were the truth, I made up my mind to give them as thorough a trial, as I did the temperance cause, (so called) six years ago. I therefore, began by the disuse of all kinds of flesh-meat and fish, coffee and tea, butter and cheese, and all kinds of grease and gravies. I also abandoned the use of tobacco in all its forms.

Notwithstanding so great and sudden a change, instead of losing health, strength, and flesh, (as was anticipated by my friends, the flesh eaters), I gained in all! I began immediately to gain as to flesh, and now weigh about ten pounds more than before my change of diet—my health has improved and my strength increased and is still increasing. I say give me a physician who makes whole without drops, powders, pills or knives, and whose only remedy is exercise, wholesome food and now and then a dose of self-denial.

My food now consists of milk, fruit, vegetables and "Graham Bread"—of which last we make enough for our own use, and no small quantity for those who are disposed to buy.

The one copy of the Journal which I have received has been the means of no less than six persons changing their course of diet, and all with good effect. I say God speed you onward! As all men will have some god, I hope your paper will induce them to choose some other than their "own belly."

Yours in haste,

Jacob W. Worthen.

N. B. We do not neglect the cold water.

DREAMING.

Dreaming is a diseased action of the nervous system, and is either occasioned by sympathy with the stomach, or by a morbid irritability of the brain. Intemperate and diseased persons are more liable to dream than healthy ones; and if a person is in the constant habit of dreaming, he may be confident that he is not in a healthy state, and will find it necessary to regulate his diet and control his passions.

But how shall we reprobate the practice of wasting the sweetest portion of the day in slumber? Where find words to censure the sluggard, who consumes in sleep those hours that should be devoted to activity? The sweetness and freshness of the morning air, the beauty of the landscape, heightened by the golden beams of the rising sun, the tuneful warblings of the birds, and the renewed life and vigor of all animated and natural objects, give an interest and value to the morning hours, unequalled by any subsequent portion of the day, and should prompt every rational person to enjoy it.

Falsely luxurious will not man awake,
And springing from the bed of sloth, enjoy
The cool, the fragrant, and the silent hour,
To meditation due and sacred song!

For is there aught in sleep can charm the wise?
To lie in dead oblivion; losing half
The fleeting moments of too short a life;
Total extinction of the enlightened soul!
Or else, to feverish vanity alive,
Wildered, and tossing through distempered dreams!
Who would in such a gloomy state remain
Longer than nature craves, when every muse,
And every blooming pleasure wait without,
To bless the wildly devious morning walk?

Thus sung the poet, Thomson, and all who are in the habit of early rising, will feel and acknowledge the truth of these lines. Indeed, there is one point upon which dietetic writers, however much they may differ in other respects, universally agree, that all persons, remarkable for their longevity, have been very early risers. So beneficial is its influence upon the health, that we would recommend all who pursue this system to rise at day-break and take gentle exercise, in the open air, at least an hour previous to breakfast.

MUSIC IN SCHOOLS.

To the Editor of the Boston Medical and Surgical Journal.

Sir,—As a Bostonian, I have been much interested in the proposed experiment of introducing musical instruction into the public schools, as a liberal measure, promising good results in several ways. But as a member of the profession, I regard it with interest in its hygienic relations to a numerous class of the community, and eventually to all.

The circumstances under which children attending school are, by the necessary regulations, unavoidably placed during school hours, are very remarkable; and though they have often occupied the attention of the physiologist, are still too much neglected. Here we have children kept for a fourth or fifth part of the twenty-four hours as nearly motionless, so far as their bodies are concerned, as the efforts of the instructors, striving against the impatience of nature and of their inclinations, can make them. There are intermissions of this constraint, indeed, which are arranged as judiciously, without doubt, as the present system will admit. But these occasional outlets for the accumulated energies of the body, though invaluable, are not what we should desire. They are altogether too short to answer the desired end; and, again, impetuous and unnatural activity with which the interval is filled up, is as inconsistent with the perfection of the vital processes, as the opposite extreme. The grand disideratum, therefore, if it be necessary to continue the time of confinement at school the same as now, must be something to relieve the dulness and oppressive inactivity of school hours on the one hand, and thereby moderate on the other hand the violence of excitement and exertion during play hours. This desideratum the introduction of singing promises, at least in some small measure, to supply. And the advantages of even a small acquisition in this way, if it become general (and for this I have no fear), will be incalculable. Nor will the gain of healthy exercise and relaxation be so small as we should at first view suppose. Under the circumstances of the schoolroom, the mere change of situation and object of attention is something; but that the absolute exercise—the consumption of nervous and muscular energy in even half an hour of disciplinary practice in singing, is very considerable, no one will deny who is acquainted with the modern thorough mode of teaching. Few kinds of exertion call into action *so much muscle at once* as singing; which brings into moderate action (these muscles being designed never to be exhausted, cannot be urged to violent effort) all the principal and auxiliary muscles of respiration. At the same time the viscera both of the thorax and abdomen, are all subjected to a vigorous action in the highest degree salutary and natural. This must be a great relief and aid to the vital functions when embarrassed by the constrained positions of the schoolroom. Again, there seems nothing irrational in the position assumed by the advocates of singing, that it fortifies the lungs, when not already morbidly disposed, against disease; on the contrary, it is highly probable that the noted increase in their capacity, and the temporary vigor conferred by it, may be connected with a permanently improved developement by which fatal diseases shall be resisted.

We must add to these advantages of singing in schools, the peculiar manner in which it exercises and awakens the attention, and the pleasant, yet harmless exhilaration which it must afford, thus acting like a safety valve upon the animal spirits, otherwise waiting to explode in uproar and mischief. The moral effects which must follow in the execution of the proposed plan, from the union of voices in harmony as opposed to discord, well deserves attention; but they cannot probably be fully appreciated till seen and felt. The subject at present might seem to be one of local interest only, but I conceive it to be far otherwise. I confidently look upon the experiment here as a starting point, from which will proceed results that will rapidly become as universal as they will be important in their bearings. And I earnestly hope that the attention of the profession generally will be directed to it as the germ of a more complete system of *general* education, in the future developement of which they will be peculiarly called upon to give their aid.

Yours respectfully,

L. C.

Boston, Nov. 10, 1837.

REVIEW OF BEAUMONT'S EXPERIMENTS.

No. 4.

BY SYLVESTER GRAHAM.

Experiments and Observations on the Gastric Juice and the Physiology of Digestion. By William Beaumont, M. D. Surgeon of the United States Army.

As an argument against the notion which had been entertained by many physiologists, that when the chyme has passed from the stomach, and previous to the reception of another meal, a quantity of gastric juice is secreted, and remains in a free state in the stomach, preparatory for the digestion of the new aliment, Dr. Beaumont says, (p. 138), that in such a case, there would be danger that the gastric juice would be weakened, by the introduction of large quantities of water or other fluids, in the intervals of eating, and thus lose its energy and concentrated solvent properties. This idea is several times expressed and implied in the Doctor's book, and seems to be a very valid one in his own mind; and yet he ought to be well aware that it is a common practice, with people of good digestive powers, to drink two and even three tumblers of water during the ingestion of a single meal; and not unfrequently do people, at the close of a meal, or some few minutes after it, take large draughts of water, cider, beer, or some other liquid. In such cases the water or the liquid must mix with the gastric juice, in some measure at least; and, according to Dr. Beaumont, reduce its energy and concentrated solvent properties. And then the stomach must perform an elective function, and absorb the water and leave the gastric juice, or it must absorb them both, or they must pass together into the small intestines; or the gastric juice must remain with the water in the stomach, to perform the digestive function in its diluted state. But if the stomach can perform the elective function of absorption, then the Doctor's objection to free gastric juice in the stomach before the reception of food, is of no force. If the diluted gastric juice is absorbed, or passed into the small intestines, and more is secreted for the digestion of the food, then his idea that the quantity of gastric juice, in its appropriate vessels, and in a state of preparation in the blood vessels, bears a fixed relation to the quantity of food demanded by the real wants of the economy, is evidently refuted by fact; and if digestion is performed by diluted gastric juice, his position is equally disturbed.

It is undoubtedly true, as the Doctor states, that free gastric juice does not accumulate in the cavity of the stomach previous to the reception of food; nor, as a general physiological fact, is there any gastric juice secreted before the ingestion of food commences. But as soon as a portion of food is received into the stomach, and excites its secreting organs, the process of secretion commences, and the gastric juice appears on the inner surface of the stomach like perspiration on the forehead of a laboring man, and becomes mixed with the food as it is carried around the gastric cavity by the muscular action or 'churning motion' of the stomach. When considerable fluid is taken with the food during the meal, as when tea, coffee, and other liquids, are constantly sipped to wash down the food, the gastric juice is less freely secreted during the ingestion, and the aqueous fluid is mostly absorbed before the process of digestion commences. But when the meal has been completed, and the process of digestion has fully commenced, if a large quantity of water or other liquid is received into the stomach, either this organ suddenly contracts upon its contents, and presses them forward towards the pyloric orifice, and thereby the powerful contraction of some of the circular fibres of its muscular coat, brings itself into the form of an hour-glass, confining the food in the pyloric end, and retaining the newly received fluid in the cardiac or larger end, till the absorbing vessels of that region shall take it up and carry it away, or else, the newly received fluid mixes with the previously received contents of the stomach, reducing them to a very diluted state and wholly arresting the process of digestion, till the fluid thus received has been absorbed or otherwise removed.—In both cases, therefore, the process of digestion is more or less disturbed, and in the latter case particularly, it is greatly retarded; and in weak, dyspeptic stomachs much oppression and distress and derangement of function is often occasioned by this cause.—Yet we know that people with healthy and vigorous stomachs will indulge in free imbibitions of water, during, and immediately following the ingestion of food, with apparently little or no inconvenience.

In regard to the temperature of the stomach, there is reason to believe that the artificial aperture in Dr. Beaumont's subject, had a considerable effect. The temperature of a perfectly natural and healthy stomach, in a vigorous, laboring man, probably ranges from one hundred to one hundred and four degrees Fahrenheit. And beyond all question, much allowance must be made, in relation to many other phenomena observed by Dr. Beaumont, on the score of the artificial condition and treatment of the stomach on which he experimented.

On the subject of saliva, Dr. Beaumont talks very loosely and evinces his want of physiological science. "Dry food," says he, "cannot be swallowed until it receives an admixture of a fluid; whether it be saliva or some other liquor, is not, I conceive, a matter of much importance." "Water will answer the purpose nearly as well as saliva." * * * * * "I have known many persons to spit freely and constantly, whose appetites and digestion were perfect. Those who smoke tobacco are constantly discharging large quantities of saliva, and yet I am not aware that dyspepsy is more common with them than with others." "The legitimate and only use of saliva," the Dr. concludes, "is to lubricate the food, and to facilitate the passage of the bolus through the organs of deglutition." Pp. 68, 69. But Dr. Beaumont ought to know that the important salivary apparatus was not inserted in the organic machinery of the human system for so unimportant a purpose as he attributes to it. In all his experiments and observations on this point he evidently confounds the salivary secretion with the mucus secretions of the mouth and oesophagus. The truth is that, in a perfectly healthy body, the salivary secretion very nearly resembles, in properties and powers, the gastric juice and pancreatic fluid, and it is not in any degree intended to "lubricate the food," (for this is done by the mucus secretions of the mouth, fauces and oesophagus,) but, like the gastric juice, to act on it as a solvent; and when the food is thoroughly masticated, and by this process, retained for a considerable time in the mouth, an incipient state of solution takes place, similar to that of the stomach and small intestines. And if Dr. Beaumont's notion in regard to the relation between the quantity of gastric juice and the quantity of food, were true, he would find that all waste of the salivary fluid would be attended with immediate inconvenience; but the stomach being compelled to make up for the delinquencies of the mouth, the evil effect of those delinquencies is seldom if ever perceived, and never duly appreciated.

But enough has been said concerning the objectionable parts of Dr. Beaumont's book. It is a far more pleasing task to point out its excellences, of which it contains many.

On the importance of mastication he insists with much truth and propriety.

"Mastication is absolutely necessary to healthy

digestion. If aliment in large masses be introduced into the stomach, though the gastric juice may act upon its surface, chymification will proceed so slowly, that other changes will be likely to commence in its substance before it will become completely dissolved. Besides, the stomach will not retain undigested masses for a long time, without suffering great disturbance. It is governed by certain laws with respect to aliment. After food has been retained for a certain length of time, undigested, say from five to ten hours, according to the healthy or diseased state of the organ, or the quantity received into it, it is either rejected by vomiting, or is permitted to pass into the duodenum and lower bowels, where its presence almost invariably produces colic, flatulence, &c. When the stomach is unusually debilitated, food, however, is frequently retained for twenty-four hours or more; and is sometimes the cause of most distressing symptoms, producing, particularly in children, convulsions and death. I therefore consider mastication as one of the most important preliminary steps in the process of digestion." P. 70.

In his numerous experiments Dr. Beaumont has fully demonstrated that the more perfectly the functions of the teeth are performed, the more easily and healthfully the function of the stomach is accomplished.

"With respect to deglutition," says he, (p. 71), "I shall make but few remarks. It is important for the preservation of health, that this process should be effected slowly. If food be swallowed rapidly, more will generally be taken into the stomach, before the sensation of hunger is allayed, than can be digested with ease. If due attention be paid to the primary step of mastication, we shall not be so likely to err in this latter; and swallowing very rapidly produces irregular contractions of the muscular fibres of the œsophagus and stomach; disturbs the vermicular motions of the nugæ, and interrupts the uniform actions of the gastric apparatus."

On introducing food into the stomach of his subject, through the artificial aperture, the Doctor found that the organ would not receive it rapidly even in a liquid state.

"If a few spoonfuls of soup or other liquid diet be put in, with a spoon or funnel, the nuga quickly close upon it, and gradually diffuse it through the gastric cavity, entirely excluding more, during this action. When a relaxation takes place, another quantity will be received in the same manner."

The Doctor shows that digestion commences much sooner, and proceeds far more rapidly than has hitherto been generally supposed by physiologists. Indolent inactivity is not so favorable to digestion as gentle exercise after a meal. Sleep after a meal decidedly retards digestion. Anger, fear, grief, &c. also retard and interrupt it. The presence of bile in the stomach retards the digestion of all other than oily or fatty substances, but is necessary for the digestion of these substances.

"Oily substances are digested with great difficulty; and the fat of all meats is converted into oil in the stomach, before it is digested."

"Bile is not essential to chymification. It is seldom found in the stomach except under peculiar circumstances. I have observed that, when the use of fat or oily food has been persevered in for some time, there is generally the presence of bile in the gastric fluids." "Irritation of the pyloric extremity of the stomach, and external agitation by kneading with the hand, on the right side, over the region of the liver and pylorus, occasion a flow of bile into the stomach."

"Magendie says, 'I believe that, in certain morbid conditions, the bile is not introduced into the stomach,' implying that, in a healthy state, it is always to be found there. There can hardly be a greater mistake. With the exceptions that I have mentioned, it is never found in the gastric cavity, in a state of health, and it is only in certain morbid conditions that it is found there." P. 95.

"When much fat meat, or oily food has been used, the oil always maintains an ascendency in the gastric cavity." P. 142.

"Bile is required, and necessarily called into the stomach, *only* for the purpose of facilitating the chymification of all fatty and oily aliments. P. 264. (See also pages 127, 147, 154, 171, 173, 178, 209, 213, from all which it is fully evident, that fat meats and oily substances of every kind, are with great difficulty digested, and tend to irritate the stomach, derange its function and disease its tissues.)

(To be concluded in our next.)

DR. JOHNSON'S OPINION ON BATHING.

If many of our disorders are produced through the agency of improper food or deleterious substances on the internal organs, so a great number of maladies are induced through the medium of atmospheric impressions and vicissitudes on the external surface of the body. These cannot be counteracted or rendered harmless by either very warm or very light clothing. The great antidote to alternations of climate consists in early and habitual exposure to transitions of temperature, drought, humidity, &c. This may be safely effected at all periods of life, from infancy to old age; and the practice, which is both easy and pleasant in operation, would save annually an immense waste of life, and a prodigious amount of sufferings in this country. It is simply the alternate application of warm and cold water (by immersion or sponging) during the first year or two to the WHOLE BODY, and afterward to the face, neck, and upper parts of the chest every morning. The application of cold water alone will not be sufficient. There must be the sudden and rapid succession of heat and cold—which I would term the CALIDO-FRIGID FORTIFIER, or prophylactic. This process not only imitates and obviates the atmospheric vicissitudes of our own climate, but is in itself salutary in any climate. The hot water excites the surface to which it is applied, and fills the capillary vessels with blood. The cold water braces the vessels thus distended, without repelling the fluid too forcibly towards the interior, or producing a chill—since the heat and excitement of the surface secure us against a sudden retrocession.

It may be asked, "How does this protect us from the introduction of cold air into the lungs?" I answer, that Nature provides against this daily and hourly contingency. The temperature of the atmospheric air is brought to a par with that of the body while passing down through the air-tubes, and before it reaches the air-cells of the lungs. For one cold that is caught by inhaling cold air, one hundred colds are induced by the agency of cold and moisture on the surface of the body. The *Calido-Frigid Lavation* or sponging, abovementioned, secures us effectually from faceaches, earaches, toothaches,* and headaches; besides rendering us insusceptible of colds, coughs—and, in no small number of instances—of CONSUMPTION itself. The practice is common in Russia and some other countries; and the principle is well understood by the profession in all countries; but the adoption of the practice is exceedingly limited in Great Britain, where it would prove extremely salutary.

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* The mouth should be rinsed with hot water and then immediately with cold, every morning throughout the year. If this were regularly done from infancy, the dentist might shut up shop.

CLOTHING.

As to clothing during the first Septenniad, I shall say little more than that it should be warm, light and loose. It will be time enough—alas! too soon—to imitate the Egyptian mummy, when girls become belles and boys beaux. I beg, for the first and second Septennisds at least, full liberty for the lungs to take air, the stomach food, and the limbs exercise, before they are "cribb'd, cabin'd, and confined" by those destructive operatives, the milliner, the tailor, and the bootmaker, *cum multis aliis*, who rank high among the purveyors or jackals to the doctor and the undertaker!

Much stress has been laid upon the use of flannel in all periods of our life. If the preservative against vicissitudes of climate to which I have alluded be employed, flannel will seldom be necessary, except where the constitution is very infirm, or the disposition to glandular affections prominent. At all events, it should be very light, and worn outside of the linen, in this tender age. *Dr. Johnson.*

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